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# Urban development practices as anticipatory action learning: case Arctic smart city living laboratory

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**Abstract**

An operational model for Arctic smart city living laboratory is presented and discussed. The model is a change-promoting process meant for the public city organization, operating in the context of smart cities, open innovation ecosystem and spatial planning. The entire city functions as a living laboratory scene with the principles of anticipatory action learning. The four urban development practices pace the exploration and exploitation of the opportunities and advantages for the city. As the public landowner, the city builds capacity for enhancing and applying innovations.


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*Keywords:* Entrepreneurial urban planning; living laboratory; operational model; practices

## 1. Introduction

With the emergence of the idea that the built environment is a source of competitive advantages for urban regions, there is a growing need for new ways to carry out integrative and proactive urban planning and development. The Finnish spatial planning system - highlighting the central role of local public urban planning

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agencies and spanning from strategic spatial planning to physical land-use planning - provides a context for researching innovative opportunity and advantage exploration and exploitation behaviors. In Finland, the central government is active in some affairs, while in most urban development issues, it hands power over to the local level. The role of the state has been economically and strategically declining. More local activity has been called.

Stemming from this kind of context, this paper presents and discusses an operational model for the Arctic smart city living laboratory, which aims at gaining sustainable economic development and welfare for the citizens. In a way the operational model could be seen as a kind of "business model" (c.f., Zott et al., 2011) for the city. The model is a dynamic, strategic and transformative (Albrechts, 2011) process meant primarily for the public city organization. The model has been designed for an open innovation ecosystem in the context of smart city (smart people, living, economy, environment and governance) and the Finnish Land Use and Building Act (LBA), in which the demands concerning public participation and inclusiveness are high. In the Arctic smart city living laboratory, the entire city functions as a living laboratory scene with the principles of anticipatory (future-oriented) action learning (learning by doing) (Mead, 2008) and focusing on challenges related to winter in the urban environment.

This paper is conceptual and exploratory by nature and builds on the practice / action learning approach. The operational model was developed within the "Integrated Urban Development Concept: Case Sustainable Winter City" (INURDECO-SWC 2012–2014) project, financed by the Finnish Funding Agency for Innovation (Tekes). In the course of the project, we participated in the Center of Hiukkavaara area detailed plan project as the observers and visiting facilitators of quadruple collaboration, implemented as the workshops integrating the expertise of the public officers of the City of Oulu, the developers of the building companies and the researchers of the University of Oulu related to the INURDECO-SWC project. In order to grasp the wider context of urban development policies and practices in Oulu, 45 interviews of public officers and other stakeholders were conducted, too. The factors of the operational model for the Arctic smart city living laboratory were developed both via the interviews and the quadruple workshops, directed for the stakeholders related to the bilateral collaboration of business, industrial or innovation policy and local land-use planning.

We introduce the process and practices of the operational model for the Arctic smart city living laboratory. In doing so, the aim of this paper is to address in the context of spatial planning the key issue:

*How can we explore and exploit the opportunities and inherent advantages of the city?*

In the second section, we introduce the living laboratory as a continuous life cycle process. In the third section, we present the operations and tools utilized in the living laboratory process. Here we emphasize the strategizing of the living laboratory, since we introduce some new unofficial spatial strategy tools that could seamlessly connect to the current Finnish urban planning practices. We conclude the paper by positing that our operational model integrates the relevant aspects of regulative urban planning conformance and risk taking performance in urban development practices.

## 2. Living laboratory as a continuous process

We define a Living laboratory as a user-centred, open innovation ecosystem that strives to facilitate research, development and innovation processes related to different public-private-people partnerships in physical, real-life contexts (Ståhlbröst 2008; Heikkanen & Österberg, 2012). Collaboration and interaction encourage learning (Saranne, 2013; Albrechts, 2011). Indeed, any attempt to understand integrative and proactive urban planning as an interactive living laboratory *process* requires it to be related to the opportunities and advantages of the smart city as well as to the background and *experience* of the participants in the planning practices of the city (see also Staffans & Väyrynen, 2009).

From the process perspective, we rely on March's (1991, 2006) concept of exploration and exploitation. Exploration refers to the pursuit of what might come to be known through creativity, experimentation, and learning and it is characterized by activities intended to recognize new ideas or opportunities that could become the foundation of future sources of advantage. In contrast, exploitation is defined as the "application of established competence to problems" (March, 2006: 205), focusing on the efficiency-seeking routines that are the foundation of the current advantage (March, 1991). We argue that the tension between exploration and exploitation of both

opportunities and advantages (as in Ahokangas & Myllykoski, 2014) drives and constraints urban planning processes when creating or transforming the city. When addressing the experience perspective we rely on the territories of experience approach discussed by Torbert (1991, 2004) and Meyer (2003), as they offer a novel way for systematically approaching urban planning as a proactive and integrative organizational practice.

Combining these two perspectives, we argue that an integrative and proactive urban planning living laboratory comprises four parallel processes sustained by the city: visioning, strategizing, performing and assessing. The exploration of the opportunities and advantages of the city can be called *visioning*. Visioning is concerned with the long-term intentions, futures, purposes and aims of the smart city. *Strategizing*, in turn, concerns the exploitation of the opportunities of the city while the advantages still remain explored, and it is concerned with planning and implementing something in and for the smart city. *Performing* is concerned with the exploitation of the opportunities with the advantages at hand. *Assessing* is concerned with the observed consequences and effects of action. The aforementioned parallel processes apply when something new is created or something existing is transformed. With the creation of something new, the processes might start from visioning and continue through strategizing and performing to assessing. With the transformation of something existing, the processes commences from performing and continues through assessing and visioning to strategizing and finally to performing. As a whole, the four practices of urban development process should be considered parallel as they cover and frame all the ongoing urban activities. Thus, the four practices pace the exploration and exploitation of the opportunities and advantages for the city (Fig. 1).

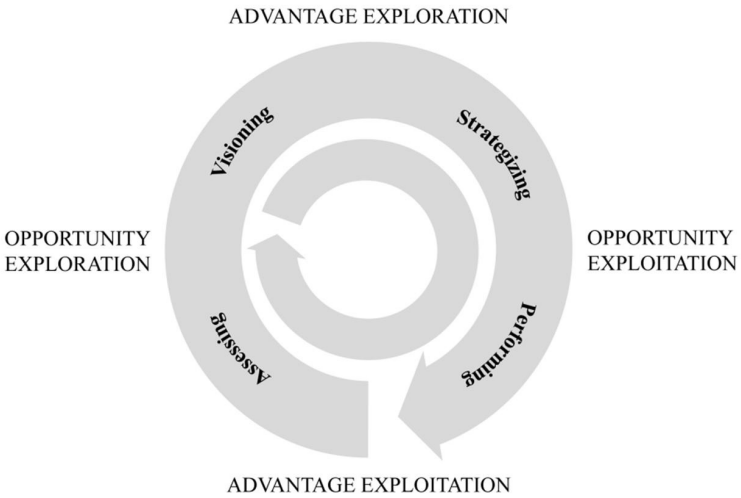


Fig. 1. Life cycle of the living laboratory process.

## 3. Operational model for the Arctic smart city living laboratory

In the Arctic smart city living laboratory, the city builds capacity for enhancing and applying innovations by working with unofficial spatial planning tools (Fig. 2). In the INURDECO-SWC project, some of the tools were either developed or newly linked to the Finnish spatial planning practices. The reciprocal order of the tools in the operational model turned out relevant. As a whole, the practices of visioning, strategizing, performing and assessing form the basis for the operational model. These four parts are next discussed in detail.

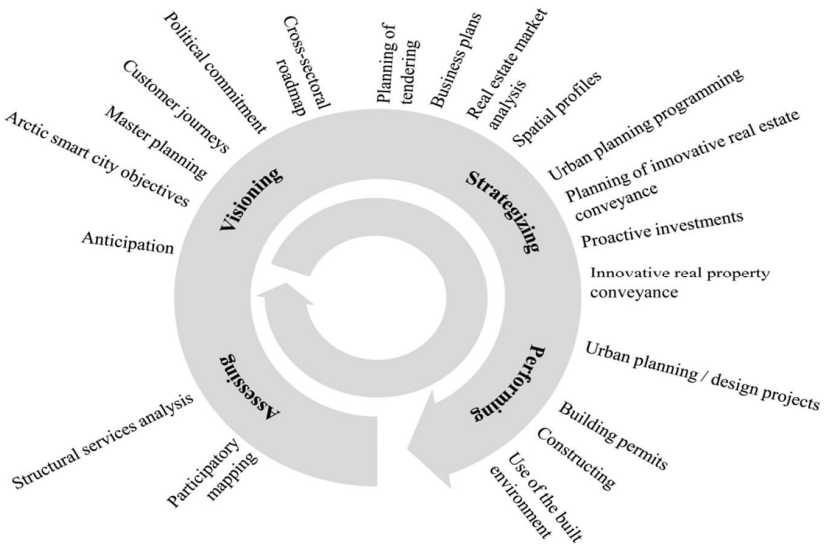


Fig. 2. Central operations and tools in the living laboratory process.

### *3.1. Visioning*

The exploration of both opportunities and (possible) advantages of the city can be called *visioning*. It is concerned with the long-term intentions, futures, purposes and aims of the arctic smart city. Visioning requires questioning whether the city organization has the opportunity and the advantages required for anticipatory action learning with spatial development activities.

Generally, the interactive dimensions of a spatial strategy making include the mobilisation of attention, the scoping of the situation or the creation of frames and the selection of actions, and finally, the enlargement of capacity. The first dimension focuses on whether, why and how to mobilize attention to an urban complex as a whole. The second emphasizes what is at stake in the planning process, for whom and where in the socio-spatial complex of an urban area. (Healey, 2009.)

In Finland, local master plans are reduced to static zoning plans, overburdened with requirements for comprehensive analyses and assessments. In addition to statutory spatial plans, new unofficial tools have been developed for operating in networked urban structures. However, urban development typically manifests as separate programs. In addition, the targeting of the research necessary to the urban planning project at hand has proven challenging. We lack agile, co-configurable spatial reference plans in which the arctic smart city topics could be envisioned and integrated as urban narratives. Occasionally, unofficial local spatial development plans exist; these could be developed to focus on the exploration of opportunities, in addition to the expression of local needs. This is a shift from the planning of a place that might exist towards the development of a place that would not otherwise be (Albrechts, 2011).

### *3.2. Strategizing*

During *strategizing*, the opportunities of development are shaped into a real spatial planning description (c.f., Ardichivili et al., 2003) once the opportunity to be exploited has been chosen and while the advantages and the competences required to make the planned doings viable may not be evident (c.f., Ahokangas & Myllykoski, 2014). First, the exploration of advantages and the selection of opportunities in the context of the built urban environment require spatial strategy making. The strategy also provides a basis for political decision-making. In the third

dimension of spatial strategy making, available knowledge and resources are mobilized and enriched (Healey, 2009). Finally, the transformative spatial strategy making calls for operation capacity for interventions.

*3.2.1. Spatial strategy tools as the innovation platform*

In strategizing the Arctic smart city living laboratory, we suggest deploying two spatial strategy tools:

- Spatial profiles for selected areas, to express local needs, plus research questions and development work challenges. These are continuously updated and they relate to smart city requirements especially from the perspective of the northern urban environment. Developers may be implied to build their contributions on different approaches to winter.
- Local land-use planning and real property conveyance programming for having the whole public urban development agency to undertake urban growth in a planned way and in a trusted manner.

These spatial strategy tools establish the platform for innovation strategy implementation. Furthermore, the strategy is enacted by the selection of a suitable operational model. This is the last phase of spatial strategy making, including the recognition of the key framing concepts and projects with the power to shape future directions and actions.

*3.2.2. Innovative real property conveyance as the implementation platform*

In the Arctic smart city living laboratory operational model, we put forth a toolkit of innovative real property conveyance, based on the managing of the landowner's risks. Landowner rights are exceptionally well protected in the LBA. This kit functions as the implementation platform for innovations and it has a remarkable closure capacity to the strategy. The chosen way of working is being tested against the exploited opportunity and advantages (c.f., Sosna et al., 2010), fostered in the spatial profiles.

In the kit, there are three types of sub-processes, i.e. so-called "Sure bets", "Threshold projects" and "Unforeseeable prospects". They differ from each other in terms of what kind of needs they are designed to meet and how foreseeable the outcomes of processes are (Fig. 3). Sure bets produce some surprises since they are due to fulfil the basic needs of the citizens. This type of a sub-process comes with expectations for cost cutting efficiency (see Mulligan, 2014). Threshold projects are to fulfil such terms and values. Results — value addition (see Mulligan, 2014) — can be foretold to the extent of threshold terms. Unforeseeable prospects rely on creative needs for self-actualisation of participants. The outcome of this type of a sub-process is unanticipated. It has a potential for revenue generation as Mulligan (2014) suggests in her typology of smart city business models).

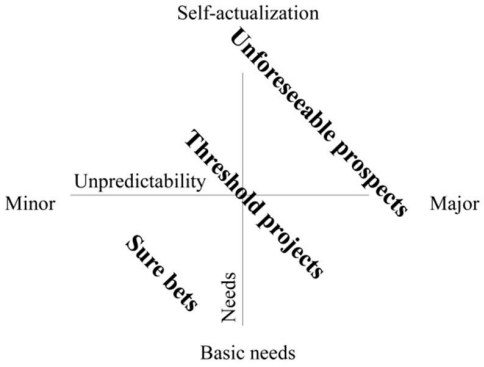


Fig. 3. Types of sub-processes applied in the innovative real property conveyance.

Building on these three sub-processes, we propose a Simple Rules toolkit regarding the city's innovative real property conveyance, following the adapted generic framework by Sull and Eisenhardt (2001). The proposed toolkit consists of six themes as follows:

- nature of opportunity;
- how-to rules for conducting activities;
- boundary rules for defining the boundaries of activities and players;
- priority rules that help to identify and rank criteria for decision making;
- timing rules that help in identifying, synchronizing and pacing things; and
- exit rules that help to identify the basis for exit or selecting things to be stopped, not to be started or given up.

*3.2.3. Simple Rules for the innovative real property conveyance*

The Simple Rules thus enable the public city organization to plan the strategy logic, steps and advantages for their action based on public landowning and real property conveyance (Table 1).

Table 1.Simple Rules for Sure bets, Threshold projects and Unforeseeable prospects.

| Elements | Opportunity | How-to | Boundary | Priority | Timing | Exit |
|---|---|---|---|---|---|---|
| Sure bets | To deploy arctic innovations on a large scale | Mass production Public domain | Stable residential and small-scale industry real estate market; statutory citizen participation | Public landownership and real property conveyance | Local land-use planning and real property conveyance programming | No plots, too expensive land acquisition, implementation overdue |
| Threshold projects | Northern built environment related, upgraded R&D work in a profitable way | Mass customization Public-private partnerships | Profiles describing arctic and/or other local challenges; terms negotiated with participants | In areas where development costs can be covered | Continuous updating and implementation phases of profiles; project plans | Threshold terms failed, bargained procurement prolonged, breach of a contract |
| Unforeseeable prospects | To co-configure cases that may generate new business concepts | Co-configuration Public-private-people partner-ships | In buzz zones, strategic/challenging areas; open innovation ecosystem as a partner | Minor control over the eco-system, openness, compensation of stakeholders' risks | Annual schedules / fixed-period planning reservations / for now | No interest in the case |

In Sure bets, opportunities to utilize public landownership for innovations related to the built environment lie in local land policies and urban planning programming based real property conveyance. The business idea for the city organization is to provide enterprises with opportunities to deploy the existing arctic innovations on a large scale and the utilization of the city's traditional real property conveyance work. This approach is applicable in the case of stable residential and small-scale industry real estate markets. The political aim remains, i.e. profitable and attractive housing for citizens, programmatic control over building sites and the full exploitation of the public built infrastructure. New advantages occur when local inner markets for arctic innovations are being generated.

In Threshold projects, opportunities to utilize landownership for innovations (or innovation potential) related to the built environment lie within terms to be set in real property conveyance. The business idea for the landowner is to provide enterprises with opportunities for the northern built environment related research and development (R&D) work in profitable ways from the viewpoint of developers. This approach is applicable in areas where development costs can be covered in construction projects, such as city centres, waterfronts and other high quality zones. The city organization may also provide partners with research cases and open data. A new strategic reference plan is needed, including challenges related to arctic urban environment and threshold terms for targeted R&D. In order to explore and exploit opportunities, we also need to be aware of recent R&D work while constructing profiles. Eventually, the advantage for the city lies in Arctic smart city areas with different profiles, pilot cases and continuously upgraded showrooms.

In Unforeseeable prospects, opportunities to utilize landownership for innovations related to the built environment lie in risk taking preceding real property conveyance. The business idea for the landowner is to provide participants with opportunities to co-configure cases that may generate new business concepts. This approach may be applied in buzz zones, such as city centres, strategic areas and infill areas. Minor control over the work process is

vital, i.e. transparency, openness, equity, vast tendering and market-based pricing are necessary. The publishing of open data and the collection of continuous feedback are beneficial, but offering an opportunity valuable enough to compensate a stakeholder's risks is a prerequisite to lure and exploit an open innovation ecosystem as a partner. The advantage for the city lies in versatile future public and private services and innovative concepts that energize enterprises related to arctic smart city services and products.

It is to the city to estimate how risky profiles it decides to maintain. As Sure bets relate to the basic needs of the citizens, they count for the majority of innovative real property conveyance. As to exploring and exploiting opportunities and advantages for the city, the share of Threshold projects and Unforeseeable prospects is conclusive. Risk profiles then indicate the planning style of the urban development agency, i.e. in regulative planning, principal stakeholders to benefit are local land and property owners, while in public-investment planning long-term resource commitments are necessary and principal benefits are targeted to local lower-income groups (Brindley et al., 1996). Regulative planning plus public investments are in the core of Sure bets. Meanwhile in Threshold projects and Unforeseeable prospects, the features of planning styles are integrated into a versatile toolkit that has also potential for market revival. This kind of entrepreneurial planning (Stoker & Young, 1993) is an interventionist approach requiring the public sector to actively promote such a development. In Threshold projects and Unforeseeable prospects, parties to benefit are many including incoming developers, the city and citizens.

### *3.3. Performing*

The Finnish land-use planning system is based on the zoning and planning hierarchy. Although in the recent years, in addition to the statutory local master plans and detailed plans, an unofficial land-use agreement system has emerged and the decentralization of the service system has begun. In 2000, the reform of the LBA resulted in an array of partnerships, consisting of municipal actors, related developer coalitions and non-governmental organizations.

In the act of *performing*, the chosen business model is tested against the exploited business opportunity and advantages at hand (Sosna et al., 2010). In Sure bets, Threshold projects and Unforeseeable prospects, the different types of sub-processes are applied. As the actual urban planning and design projects operate with the physical built environment, craft, mass production or mass customization may be utilized in the draft phase. However, since Sure bets deliver the majority of projects, mass production can be considered efficient. Accordingly, traditional juridical quantitative public procurement is suitable. For Threshold projects, the modular principles of mass customization offer a solid basis in spatial profiles that guide threshold terms. Qualitative competitive bargained procurement or drop-off real property conveyance competitions and land-use agreements fit with this sub-process. As to Unforeseeable prospects, spatial reference plans and flexible, prefabricated detailed plans are highlighted in order to enable co-configuring of targeted innovative projects. After the preparations for the environmental, social, health and technology impact assessments, tools for development and innovation analysis may be adapted, such as customer journeys and other challenge settings, competitions for transdisciplinary concepts, pre-commercial procurement, areas for analysis and competition entries, unseparated parcels and other platforms or services for co-configuring, such as planning reservations. In sum, urban planning and design projects may be utilized as living laboratories, since after all, building permits are subject to license.

### *3.4. Assessing*

In the act of *assessing*, the consequences and effects of action are observed. In the context of urban planning and development, it may take a decade to proceed from city-wide spatial visioning and strategizing to performing — constructing and eventually to the use of the built environment. Thus, it is essential to the living laboratory process to run continuously and have parallel operations. In the Arctic smart city living laboratory operational model, the assessing gradually merges with visioning, since former outdated spatial development plans are subjected to criticism and new visioning. To be able to assess succeeding in planning, goals should be expressed accurately in plans (Staffans & Väyrynen, 2009). Related to the assessing of the built environment, other dimensions of the smart city are also evaluated by linking public and private service assessments closely to local master planning, spatial

strategic reference planning and service design. In addition, exploited competitive advantages are being evaluated, not only against exploited opportunities but also against possible alternative opportunities.

## 4. Conclusion

We have studied how the opportunities and advantages of the city can be explored and exploited in the context of spatial planning and built environment. The aim of the Finnish land-use planning system is to produce legally binding plans that enable development and implementation. In order to realize the full potential for opportunity and advantage exploration and exploitation, the process planning with risk management and the use of new unofficial strategic spatial tools are called for in anticipatory urban development. Especially, the Finnish land-use practices lack iterative collaborative *visioning* and *strategizing* practices. Thus, the *strategizing* practices were developed.

We conclude that entrepreneurial risk taking actions and regulatory urban planning/development take turns along the life cycle of living laboratory processes. The city can on its discretion apply both soft and hard control methods on the four practices. Planning styles also vary in urban development and the different sub-processes from the toolkit of innovative real property conveyance are utilized in exploring and exploiting opportunities and advantages for the city. It is also noticeable that the four acts may be applied on different scales, such as city-wide, focused to an area within the city and a block. In any of these cases, the integration of both the entrepreneurial approach and a public organization's political ethos calls for skilled process facilitation, but the city-wide living laboratory process seems to be a prerequisite for diverse living laboratory hubs and projects located in the city.

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